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THESIS

A STUDY OF THE RELATIONSHIPS BETWEEN AMOUNT OF GAIN UNDER REMEDIAL READING INSTRUCTION AND INTELLIGENCE, AS WELL AS CERTAIN OTHER FACTORS

Submitted by

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(B.S., New Haven Teachers College, 1942)

In partial fulfillment of the requirements for the degree of

Master of Education

1943

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INTRODUCTION

INTRODUCTION

The primary purpose of this study is to discover the relationship between amount of gain in remedial instruction and intelligence. The advisability of admitting children with low intelligence to remedial instruction is often based on the supposition that there is a high relationship between amount of gain in remedial instruction and intelligence, and as a result children of low intelligence are often excluded from instruction. The gains made by children under remedial instruction administered in three different situations have been measured in terms of several factors.

A great deal has been written on remedial reading yet few experiments have been carried on to determine the amount of gain made over definite periods of time. Still fewer studies have been made to determine the relationship between amount of gain and intelligence. Many remedial reading experiments limit themselves by excluding from the experimental group children below a certain I.Q. on the basis that low intelligence limits the improvability of students under remedial instruction. A summary is presented of the most revealing studies.

A study by Monroe[1] of children who were given remedial reading instruction stated that one group of children who did

1. Monroe, Marion. Children Who Cannot Read. University of Chicago Press, Chicago, Ill., 1931.

not make normal progress was a group with inferior intelligence who were, "regarded by the teachers as unlikely to improve, an attitude which inhibited pupils results."...The author goes on to say, "We found it much easier to obtain the teachers cooperation in cases of superior and average intelligence than in cases of dull or inferior intelligence.

This expression typifies the general attitude towards dull children in regard to their acceptance for remedial instruction.

In the Monroe study the amount of progress of the group of children of low intelligence as compared with the group of higher intelligence is smaller but progress was made. In a group which received intensive remedial instruction the children of low intelligence gained almost one grade between the first and last tests. In the group receiving moderate remedial instruction the gain was little more than half a grade and in a group that received no remedial instruction there was no gain recorded. The children with intelligence quotients below 90, gained a mean .96 years after a mean 22.8 hours of instruction.

Two investigations by McCullough[2] are pertinent to the subject. A ninth grade class of six boys and eighteen girls were given nine weeks of corrective reading instruction. The scores on initial and final reading achievement tests and

2. McCullough, Constance. "Relationship between Intelligence and Gains in Reading Ability." Journal of Educational Psychology. 50:688-92. December, 1959

initial intelligence tests were the available data. The relationship between reading improvement and intelligence was .00 by the Pearson Product Method of correlation. Three of the students had reading ages which exceeded their mental ages a fact which the author says disputes the non-acceptance of cases whose mental age and reading age are the same or similar.

The second investigation deals with forty-nine students in Hiram College who received ten weeks of training for improvement in study habits, oral and written expression, reading speed and comprehension and verbal and non-verbal intelligence.

The Iowa Silent Reading Test was administered in September and January and the N. 48A. C. E. Psychology Test and the California Test of Mental Maturity were administered in September. The results inficated somewhat similar relationships between intelligence test scores on the language parts of both tests and reading comprehension, and a somewhat meagre relationship between the non-verbal parts of the tests and reading comprehension. This would indicate that there is a relationship between reading comprehension and intelligence according to this study for if we consider verbal tests more reliable for reading disability cases and the correlation between verbal tests and reading comprehension scores is fairly high, this assumption might be made.

There are, however, too few cases to make a positive statement.

According to both studies there is no relationship between intelligence scores and comprehension improvement, and in the Hiram study, of intelligence test scores and improvement of speed of reading tests. The data in these two investigations while compiled on a relatively small number of cases does suggest that further studies be made of the relationship of improvement in reading and intelligence test scores.

Fitzgerald[3] reports on an experiment conducted in the Walsh school in Chicago, in a remedial reading clinic with 125 children retarded in reading. Kuhlmann-Anderson Tests of Intelligence were administered to the children and intelligence quotients ranged from 70-110. The New Stanford Reading Achievement Test and Gates Primary Reading Tests were used for determining reading achievement. These tests were given in October and again in January with another form. The teaching period was about three and one half months. The average gain made after instruction was 6.6 months. Thirty pupils with an average obtained I.Q. of 85.03 and retarded an average 2.7 years gained an average 7.03 months. Forty-five pupils with an average obtained I.Q. of 88.2 retarded on an

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3. Fitzgerald, James: "A Diagnostic and Remedial Program in Reading." Education Methods. 17:221-335. February, 1938.

average 1.45 years made average gains of 6.91 months and thirty one pupils with an average obtained I.Q. of 93 and retarded on an average of .61 years made average gains of 4.65 months. The children handicapped the most and with the lowest I.Q.'s made the greatest gains. The results show large gains may be made over a short period even though the children are not superior.

Kirk[4] studied the reading progress of a group of children with a mean chronological age of 13-9 and a mean I.Q. of 75. Their progress was 1.2 grades in reading in a period of five months training. Their progress under treatment was over five times that of one hundred unselected mentally retarded children in an institution.

An experiment was carried on in the clinic at the State Normal School,[5] Oswego, New York, in which the twenty-four cases were given the Stanford Binet Test of Intelligence. Sixteen cases had chronological ages exceeding mental ages by approximately twelve months. Nine cases showed retardation of two years or more. In comparing the scores of the New Stanford Test of Reading Achievement and the Gates Primary Reading Test, sixteen cases showed reading retardation of from six to thirty

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4. Kirk, Samuel A. "The Effects of Remedial Reading on the Educational Progress and Personality Adjustment of High Grade Mentally Deficient Problem Children: Ten Case Studies." Journal of Juvenile Research. 18:140-62. July, 1934

5. "Challenging the Learner." Elementary English Review. 15:149-158. April, 1938.

months. Eight cases had mental ages in excess of reading ages. After remedial instruction the gains ranged from two to forty-three months in six weeks. The data is on too few cases but it shows that further investigation should be made on the subject.

A five year experimental program[6] for slow-learning pupils for five years in Speyer School in New York which was organized to try out new methods and materials and new types of instruction. In seven classes of slow-learning children the range in I.Q. was 70-90 in the beginning. Variations in I.Q. at the end of five years gave classes a wider spread. Reading tests given at four month intervals for three and one half years showed growth in reading ability which kept pace or slightly exceeded development of the Stanford Binet mental age. These children were compared with a control group of equivalent chronological age, mental age, intelligence quotient, socio-economic status and out of school surroundings as to reading abilities and interests. The Speyer group were somewhat superior in reading ability, and strikingly superior in reading done on own initiative. This experiment was carried on for the primary purpose of testing new types of methods and materials but an interesting note is that

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6. Gates, Arthur I. and Pritchard , M.C. "Teaching Reading to Slow-Learning, or Dull-Normal Pupils." Teachers College Record. 43:255-263. January, 1942

under good instruction children that are slow-learning can progress in reading along with progress in mental age.

The research discussed presents the evidence on the relationship between intelligence and the amount of gain made under remedial reading. On the basis of this evidence it is not advisable to exclude children of low intelligence from remedial instruction. Too many educators present criteria for determining eligibility for remedial instruction and fail to present sufficient evidence on which the criteria is based.

Chapter II

NATURE AND SOURCE OF THE DATA

NATURE AND SOURCE OF THE DATA

Three sets of data have been analysed in this study to determine the relationship of the amount of gain made under remedial reading instruction to certain factors. The records were taken from the files of a Remedial Reading Center of a public school system.

Second and Third Grade Study

The first set of data consists of the records of one hundred second and third grade children, who were selected for remedial reading instruction on the basis of a reading test given in May, preceding instruction in the fall, and a reading test given on admission to instruction. The children were taught by a remedial reading teacher for two separate hours a week and received from thirty to forty hours of instruction during the year.

The reading sections of the Primary I Battery, Form A, of the Metropolitan Achievement Test were administered in May preceding instruction in the fall, and measured word pictures, word meaning, and word recognition. In May, at the end of the year in which instruction was given, the reading sections of the Primary II Battery, Form B, of the Metropolitan Achievement Test were administered and measured reading completion, paragraph reading, and vocabulary.

In some cases the other forms of the Metropolitan Test were used. Age and grade equivalants for complete batteries, all forms were available.

The Stanford Revision of the Binet Intelligence Test was administered to each of the children upon their entrance to the first grade. In the case of transfer the test was given when the child entered the school. Current chronological ages and the obtained I.Q. were used as a basis for deriving current mental ages.

The Durrell Analysis of Reading Difficulty was administered individually in October on admission and again in May on discharge, and measured oral reading comprehension and recall, silent reading, flashed word recognition and word analysis.

The following facts have been taken from the records and charted:

1. Chronological age on admission
2. Mental age on admission
3. I.Q. (Stanford Revision of the Binet)
4. Initial reading age
5. Amount of retardation
6. Initial Reading Grade of children whose reading ages exceeded their mental ages.

7. Amount of gain made in reading
8. Chronological age on admission compared with amount of gain
9. Initial reading age compared with amount of gain
10. Amount of retardation compared with amount of gain.

Fourth Grade Study

The second set of data consists of the records of ninety-three children who received remedial instruction in a fourth grade remedial reading room.

The records available were the results of an initial reading test given in May in the third grade, a final reading test given in May in the fourth grade, a group test of intelligence given in the second or third grade, and an analysis of the children's needs made by the third grade teacher.

The regular fourth grade curriculum was followed in this fourth grade remedial reading room but everything centered around reading. All the regular subjects were taught but were integrated with a program of language skills.

The initial reading test was the reading sections of the Primary III Battery, Form B, of the Metropolitan Achievement Test, which measured reading completion, paragraph reading and vocabulary. The final reading test was the reading sections of the Intermediate Battery, Form A of the Metropolitan Achievement Test which measured reading completion and vocabulary.

The Kuhlmann Anderson Tests of Intelligence were administered in the second or third grade. This test is a group test of intelligence and about one third of it requires reading ability and so the intelligence quotients and mental ages of the children might be lower than they should be, if the child had a reading disability. Current chronological ages and obtained I.Q. were used as a basis for deriving current mental ages.

The following facts were taken from the records of these ninety-three children and charted:

1. Chronological age on admission
2. Mental Age when initial reading test was given
3. I.Q. (Kuhlmann-Anderson)
4. Initial reading age
5. Amount of retardation
6. Initial reading grade of children whose reading ages exceeded their mental ages

7. Amount of gain made in reading
8. Chronological age on admission compared with amount of gain
9. Initial reading age compared with amount of gain
10. Amount of retardation compared with amount of gain.

Ninth Grade Study

The third set of data consists of the records of one hundred and thirteen children of ninth grade classes in a Junior High School. These students were selected for remedial instruction on the basis of the results of the Iowa Silent Reading Test, Form A, which was administered in June, preceding instruction which began in the fall.

The students were grouped into classes which met every day. Remedial reading instruction was based on improvement of reading speed, and comprehension, increasing of vocabulary, cultivation of a desire to read and tastes in selections read, and was administered by the regular English teacher.

The Iowa Silent Reading Test, Form A, measured paragraph meaning, word meaning, paragraph organization,

sentence meaning, location of information and rate of silent reading. This same test was administered in June at the end of the period of instruction, a fact which might account for some of the gains made by the students due to familiarity with test requirements and method.

The Henmon-Nelson Tests of Mental Ability, High School Examination, for grades 7-12 Form A, were administered in February in grade eight. In this group test of intelligence practically all the items require reading ability and this fact may have affected the resultant mental ages and intelligence quotients derived from the administration of the test. Current chronological ages and obtained I.Q. were used as a basis for determining current mental ages.

The following facts were taken from the records of the one hundred and thirteen students and charted:

1. Chronological age on admission
2. Mental age when initial reading test was given
3. I.Q. (Henmon-Nelson)
4. Reading grade on admission
5. Amount of gain made in reading
6. Chronological age compared with amount of gain
7. Initial reading age compared with amount of gain.

Chapter III

ANALYSIS OF DATA

ANALYSIS OF DATA

Second and Third Grade Study

Description of Data

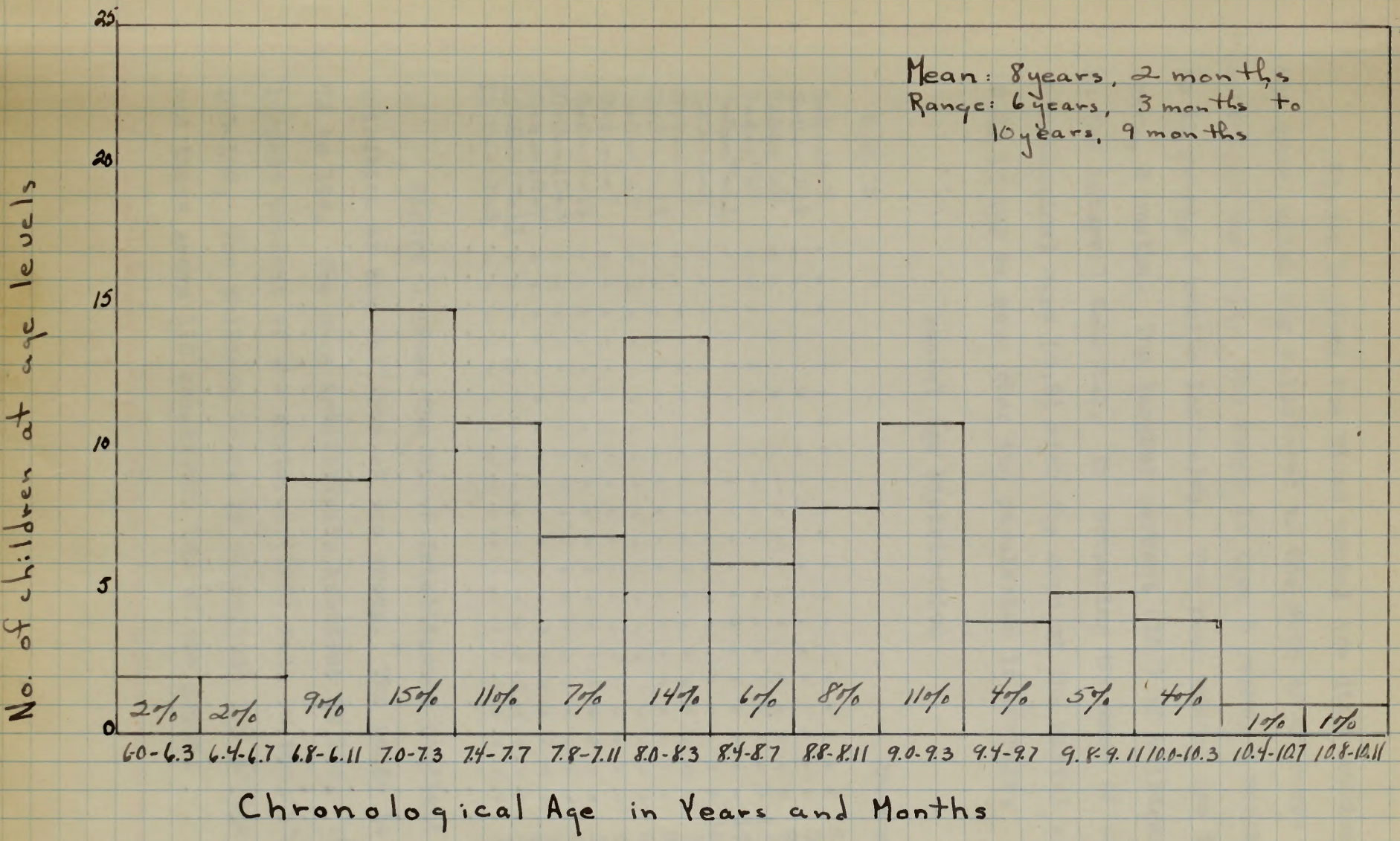
Figure 1 shows the chronological age distribution of one hundred second and third grade children. This life age is calculated to the date of the beginning of the school year which was in September.

The chronological age range is from 6 years, 3 months to 10 years, 9 months inclusive. The mean age is 8 years, 2 months. Most of the children (15%) fall in the interval 7-0--7-3.

Age Distribution

Ages	Frequencies
6-0--6-3	2
6-4--6-7	2
6-8--6-11	9
7-0--7-3	15
7-4--7-7	11
7-8--7-11	7
8-0--8-3	14
8-4--8-7	6
8-8--8-11	8
9-0--9-3	11
9-4--9-7	4
9-8--9-11	5
10-0--10-3	4
10-4--10-7	1
10-8--10-11	1

Figure 1



AGE DISTRIBUTION OF ONE HUNDRED CHILDREN

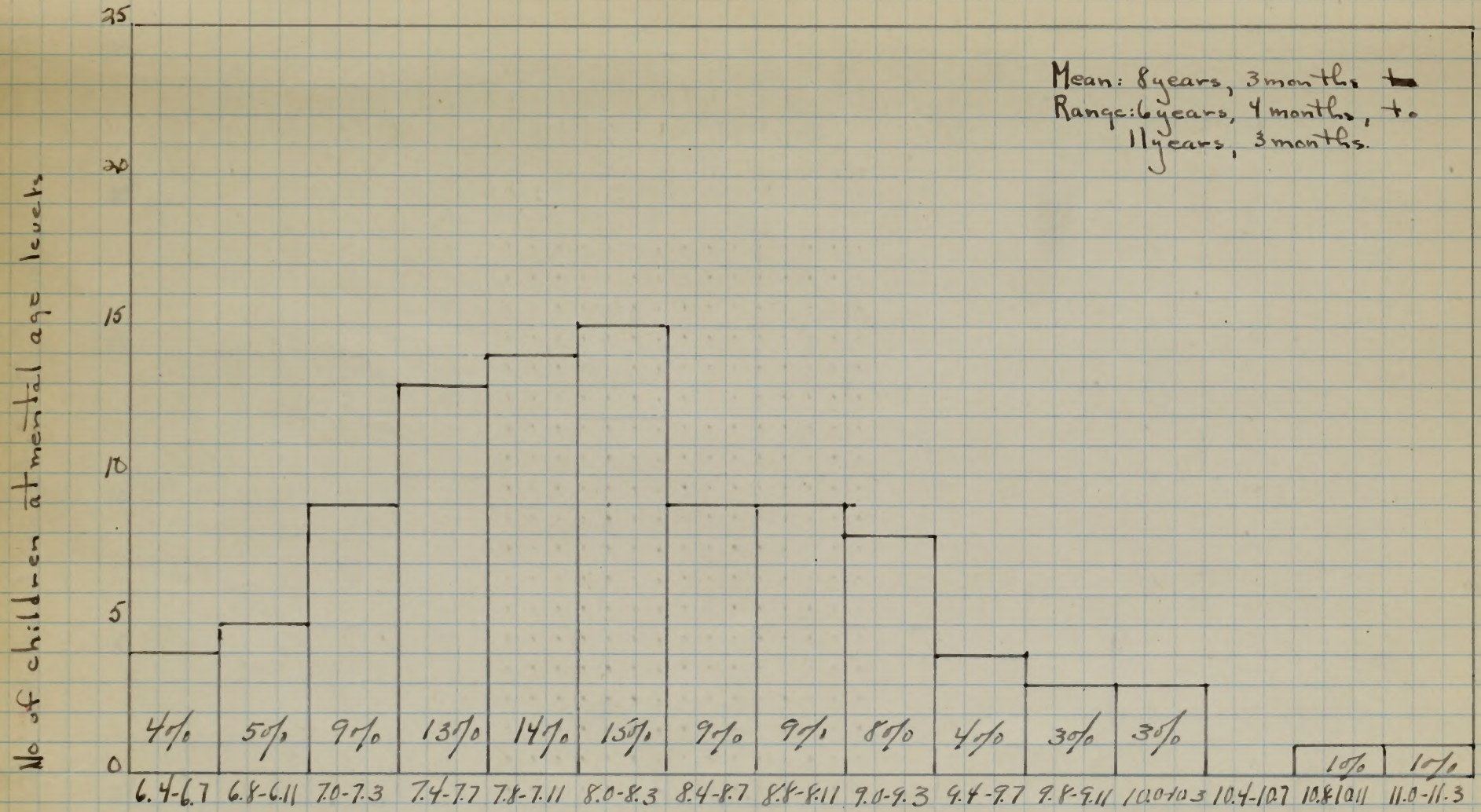
Figure 2 gives the Binet mental age distribution of the group which was calculated to the date of entrance in school in the fall. The range is from 6 years, 4 months to 11 years, 3 months inclusive. The mean mental age is 8 years, 2 months. The largest percent (15%) of children fall in the interval 8-0--8-3. In comparing the mean of the chronological ages (8.2) with the mean of the mental ages (8.2) it may be seen that the population is average.

Mental Age Distribution

M.A.'S	Frequencies
6-4--6-7	4
6-8--6-11	5
7-0--7-3	9
7-4--7-7	13
7-8--7-11	14
8-0--8-3	15
8-4--8-7	9
8-8--8-11	9
9-0--9-3	8
9-4--9-7	4
9-8--9-11	3
10-0--10-3	3
10-4--10-7	0
10-8--10-11	1
11-0--11-3	1

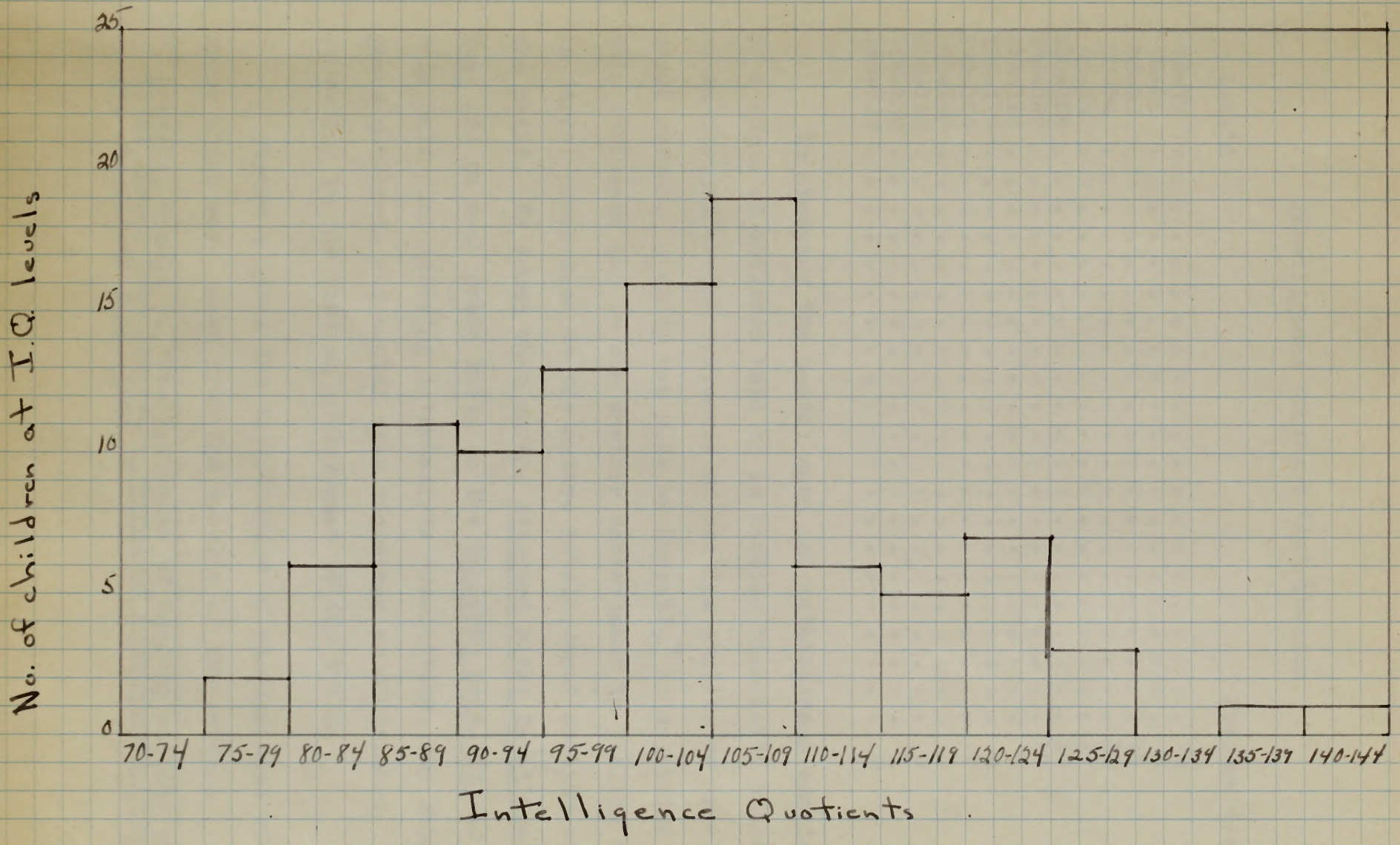
Figure 3 gives the Binet Intelligence quotient distribution of the children of the group. The range is from 75 to 144. The mean intelligence quotient is 103. The largest percent of the children (19%) fall in the interval 105-109. The children below 90 constitute 19% of the group and those above 110 constitute 24% of the group.

Figure 2



Mental Age Distribution of One Hundred Children

Figure 3



DISTRIBUTION OF INTELLIGENCE QUOTIENTS OF ONE HUNDRED CHILDREN

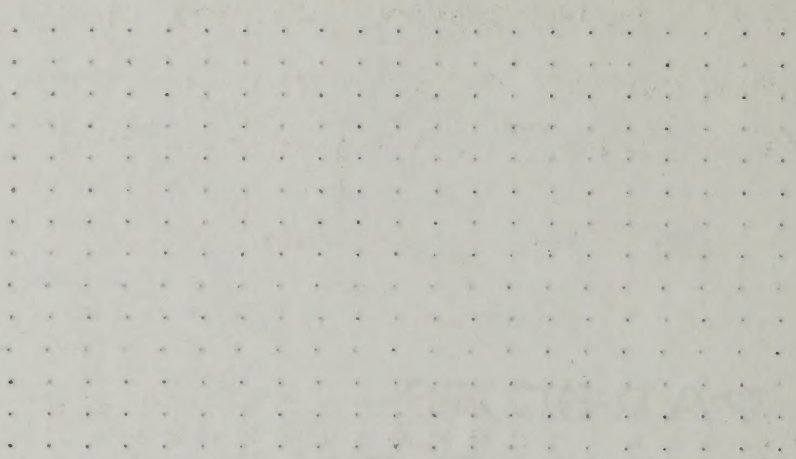
Intelligence Quotient Distribution

I.Q.'s	Frequencies
75-79	2
80-84	6
85-89	11
90-94	10
95-99	12
100-104	16
105-109	19
110-114	6
115-119	5
120-124	7
125-129	3
130-134	0
135-139	1
140-144	2

In studying the mental ages and intelligence quotients of a group of children held to be reading disability cases we must consider the influence of reading ability on intelligence scores. A study was made by Durrell,[7] to determine this influence and to see whether achievement in reading was in direct proportion to the native intellectual ability of the child. He found that on the Stanford Binet Intelligence Test and on such group tests as the Haggerty Delta II and the Otis Self Administering Intermediate Examination, the intelligence quotients and mental ages increased or diminished according to the reading achievement of the child.

Figure 4 gives the distribution of reading ages of the group which were taken from the results of the initial

7. Durrell, Donald D. "The Influence of Readong Ability on Intelligence Test Scores." Journal of Educational Psychology. 24:412-16 Sept. 1933



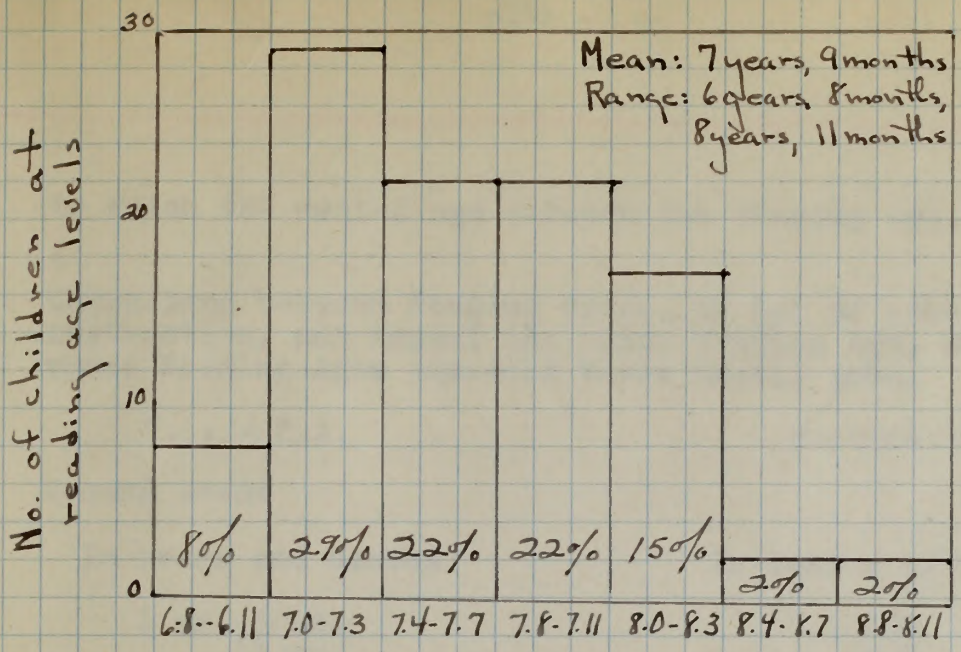
reading test given in May. The range of reading ages was 6 years, 8 months to 8 years, 11 months with a mean reading age of 7 years, 9 months. The largest percent of the children (29%) fall in the interval 7-0--7-3. In comparing the mean reading age with the mean mental and chronological age it may be seen that it is 5 months below them.

Reading Age Distribution

R.A.'s	Frequencies
6-8---6-11	8
7-0---7-3	29
7-4---7-7	24
7-8---7-11	21
8-0---8-3	15
8-4---8-7	2
8-8---8-11	1

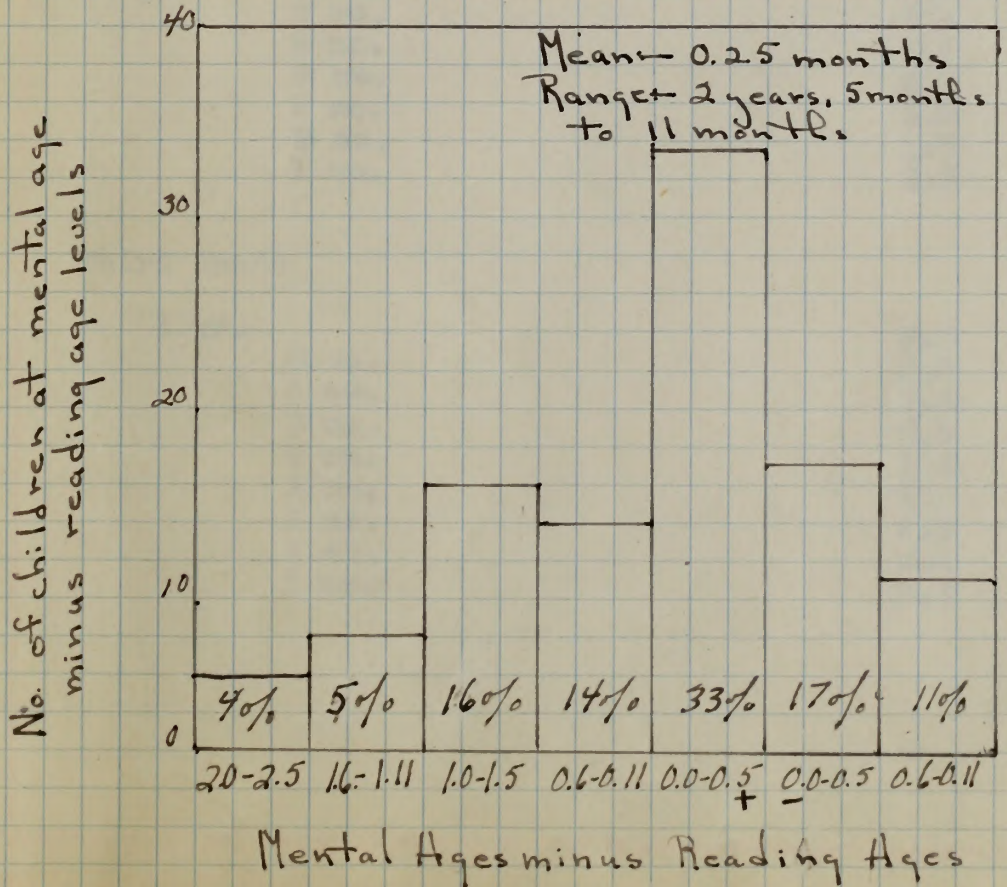
In order to determine the amount of retardation in reading the reading age of each pupil was subtracted from the mental age. In some cases the result was minus quantity indicating that the child was reading beyond his mental age. Figure 5 shows the distribution of the amount of retardation. Twenty-eight children (28%) had reading ages in excess of their mental ages. A comparison of the children with reading ages in excess of their mental ages corresponding reading grade shows that none of the children were reading up to grade at the time of the initial reading test, yet none of them were reading disability cases according to our present criteria of reading disability defined as the extent

Figure 4



DISTRIBUTION OF READING AGES OF ONE HUNDRED CHILDREN

Figure 5



DISTRIBUTION OF MENTAL AGES MINUS READING AGES OF ONE HUNDRED CHILDREN

to which the mental age exceeds the reading age.

Comparison between Reading Grade, in May of year preceding instruction, and Mental Age minus Reading Age, of children whose Reading Ages exceeded their Mental Ages.

M.A. - R.A.	Reading Grade
Second Grade	
In years and Months	In tenths of year
1 yr. 3 mo.	2.0
11 mo.	2.3
11 mo.	2.2
11 mo,	2.1
11 mo.	1.9
10 mo.	1.8
9 mo.	2.4
9mo.	1.9
7 mo.	2.3
5 mo.	2.1
4 mo.	2.4
4 mo.	2.4
2 mo.	2.4
2 mo.	2.3
2 mo.	2.0
2 mo.	1.8
2 mo.	1.6
1 mo.	2.3
Third Grade	
1 yr.	2.2
8 mo.	2.9
4 mo.	2.8
3 mo.	2.9
3 mo.	2.9
1 mo.	2.7
1 mo.	2.6
1 mo.	2.4
1 mo.	2.2

Mental Age Minus Reading Age Distribution

M.A. - R. A. In years and months	Frequencies
0-6---0-11	11
0-0---0-5	17
0-0---0-5	33
0-6---0-11	14
1-0---1-5	16
1-6---1-11	5
2-0---2-5	4

Analysis of Gains

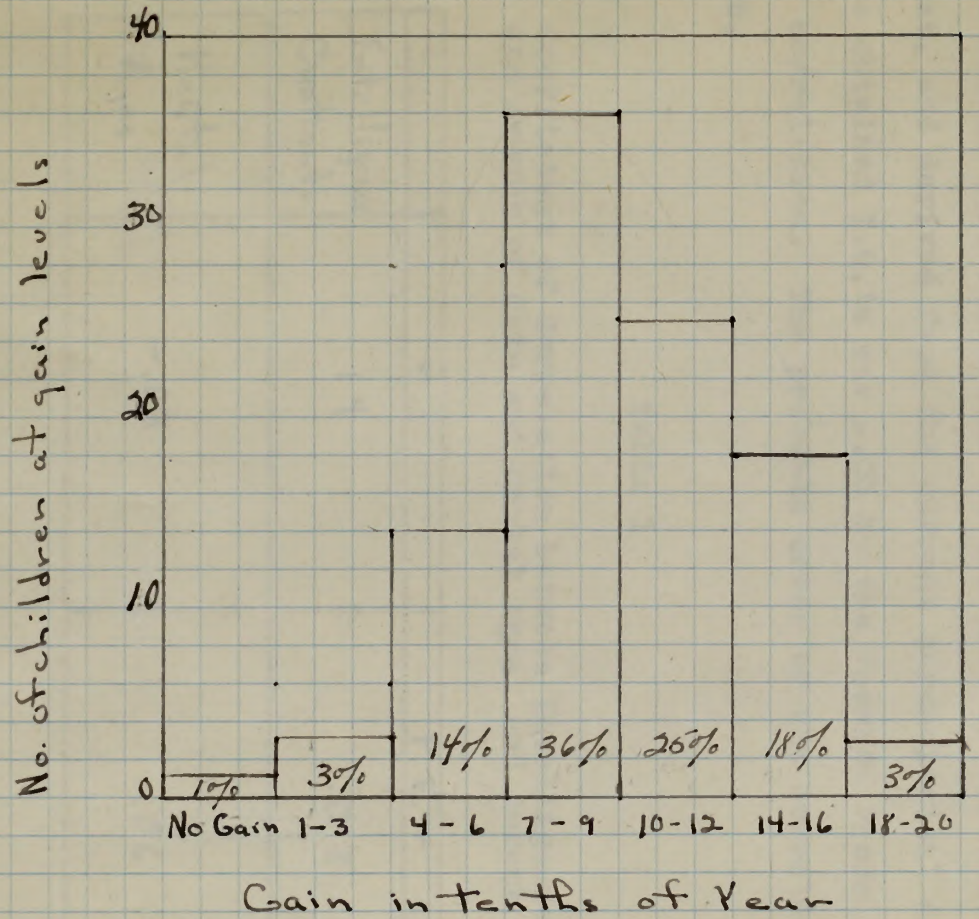
The amount of gain under remedial reading instruction made by the one hundred children in the second and third grades has been studied by correlating it with the intelligence quotients and mental ages of the group and by comparing it with the chronological age, initial reading age and amount of retardation of the group.

The amount of gain in reading was determined by averaging the results of the two initial reading tests and the two final reading tests and subtracting the averages from one another.

The distribution of the amount of gain made by the group, shows a range of from no gain, to 1 year, 8 months gain. The mean gain is 9.4 months. 46% made over one years gain, 53% made less than one years gain and 1% made no gain.

Amount of Gain Distribution

Gain in tenths of year	Frequencies
No Gain	1
1---3	3
4---6	14
7---9	36
10---12	25
13---15	18
16---18	3



DISTRIBUTION OF AMOUNT OF GAIN IN READING OF ONE HUNDRED CHILDREN

The correlation between amount of gain in reading and the intelligence quotients derived from the Stanford Revision of the Binet Intelligence Tests was .14 by the Pearson Product Method of correlation. The probable error of the correlation was .08.

The correlation between amount of gain in reading and the mental ages calculated at the time of the initial reading test, and derived from the current chronological ages and the obtained I.Q.'s was -.03 by the Pearson Product Method of correlation. The probable error of the correlation was .06.

Table 1

Coefficient of Correlation between Intelligence Quotients and Amount of Gain and Mental Ages and Amount of Gain

	r	P. E. r
Intelligence Quotients	.14	.08
Mental Ages	-.03	.06

The comparison between chronological ages and amount of gain is shown in Table 2. The greatest mean gain, (.95) was made by children falling in the intervals 9-0--9-11, 8-0--8-11, and 7-0--7-11. The next mean gain, (.9) was made by children falling in the interval, 10-0--10-11, and the smallest mean gain, (.87) was made by the childred falli g in the interval (6-0--6-11). No particular age group made gains that were markedly superior to any other age group.

Table 2

Chronological Age on Admission vs. Gain

Gain in tenths of year

C.A.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	No.	Mean
10-0--10-11		1	3	1	1				6	.9
9-0--9-11		4	6	4	5				19	.95
8-0--8-11		4	10	6	6	1			28	.95
7-0-7--11	3	3	10	13	5	1			35	.95
6-0--6-11		3	6	1	1	1			12	.87

Initial reading age and gain in reading is compared in Table 3. The highest mean gain (1.1) was made by children in the intervals 8-4--8-7, 8-0--8-3 and 7-8--7-11. Considering the interval 8-0--8-3 the highest interval because of the few cases in the intervals higher, on the whole the highest mean gain was made by the children with the highest reading ages. However, the children in the next two intervals made only two months less gain, (.9) and the children with the lowest reading ages made only four months less gain.

Table 3

Initial Reading Age vs. Gain

R.A.	Gain in Tenths of Year										
	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	No	Mean
8-8--8-11				1						1	1.8
8-4-8-7				1		1				2	1.1
8-0-8-3				7	2	6				15	1.1
7-8--7-11			4	2	9	7				21	1.1
7-4-7-7	1	1	3	11	4	2	2			24	.9
7-0-7-3			6	12	7	2	1			29	.9
6-8-6-11		2	1	2	3					8	.7

Mental age minus reading age is compared with gain in reading in Table 4. On the basis of this comparison it may be seen that the amount the children were retarded did not determine the amount of gain they made in reading.

The children falling in the intervals 1-6--1-11, 1-0--1-5, and 0-0--0-5 made the same mean gain, (1.) and the children falling in the intervals 0-6--0-11, 0-0--0-5, and 0-6--0-11 made the same mean gain. (.8) The greatest mean gain (1.3) was made by the children falling in the interval (2-5--2-11). These results would seem to refute statements made which limit remedial instruction to children who have mental ages in excess of their reading ages. Bond and Bond[8] make the statement, "The remedial reading program should concern itself with the students who have wide discrepancies between their mental ability and their reading ability." Durrell[9] also makes the statement, "The children with the greatest difference between their mental ages or reading capacity scores, and their reading achievement scores should be the first ones chosen for the remedial reading class." Mental age did not set a limit on the gains made by these children, however.

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8. Bond, Guy L., and Bond Eva. Developmental Readi g In High School. MacMillan Company, New York, 1941

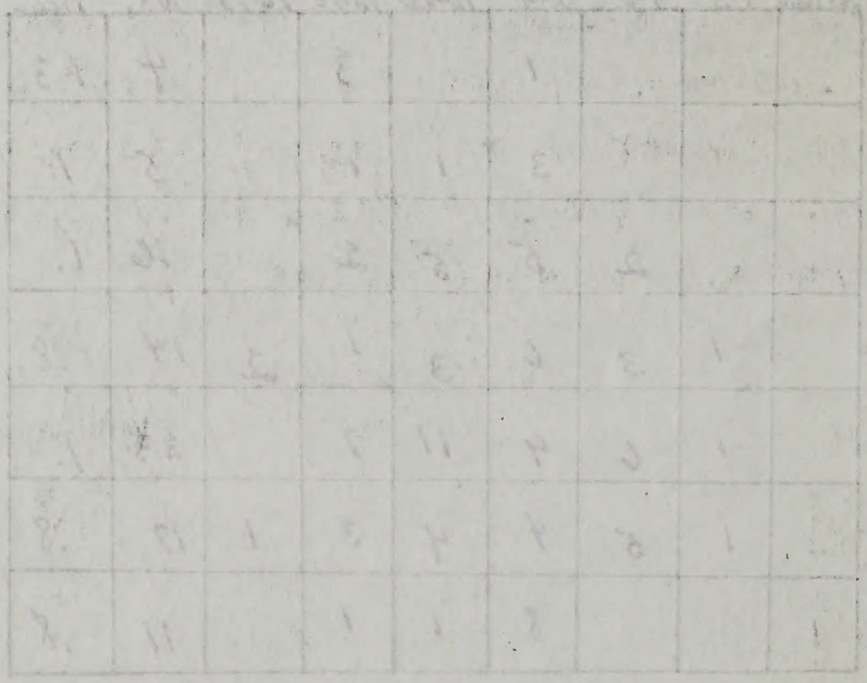
9. Durrell, Donald D. Improvement of Basic Reading Abilities. World Book Company, Yonkers on Hudson, New York, 1940

Table 4

Mental Age minus Reading Age vs. Gain

Gain in Tenths of Year

M.A-R.A.	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	No.	Mean
2-0--2-5				1		3		4	1.3
1-6--1-11				3	1	1		5	1.
1-0--1-5			2	5	5	2		16	1.
0-6--0-11		1	3	6	3	1	2	14	.8
0-0--0-5 +		1	6	9	11	7		33	1.
- 0-0--0-5		1	5	4	4	3	1	17	.8
0-6--0-11	1			8	1	1		11	.8



Fourth Grade Study

Description of Data

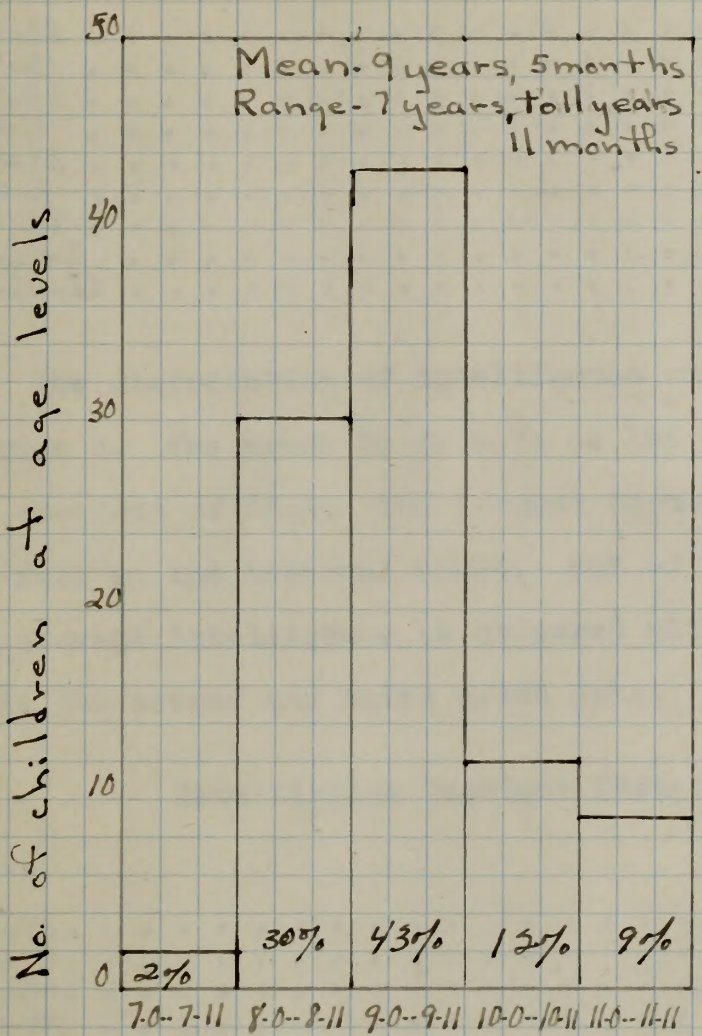
Figure 6 illustrates the chronological age distribution of the ninety-three children in the remedial reading fourth grade, calculated to the date of the beginning of school in September. The range is from 7 years to 11 years, 11 months with a mean age of 9 years, 5 months. The largest percent of the children fall in the interval 9.0--9.11.

Age Distribution

Ages	Frequencies
7-0--7-11	2
8-0--8-11	30
9-0--9-11	40
10-0--10-11	10
11-0--11-11	9

Figure 7 shows the mental age distribution of the group. The mental ages are calculated to the date of the initial reading test in May. The range is from 6 years, to 10 years, 11 months with a mean age of 8 years, 7 months, 10 months below the mean of the chronological age. The largest percent of the children (32%) fall in the interval 8-6--8-11.

Figure 6



DISTRIBUTION OF CHRONOLOGICAL AGES OF NINTY-THREE CHILDREN

Mental Age Distribution

M.A.	Frequencies
6-0--6-11	3
7-0--7-5	0
7-6--7-11	7
8-0--8-5	22
8-6--8-11	29
9-0--9-5	23
9-6--9-11	6
10-0--10-5	2
10-6--10-11	1

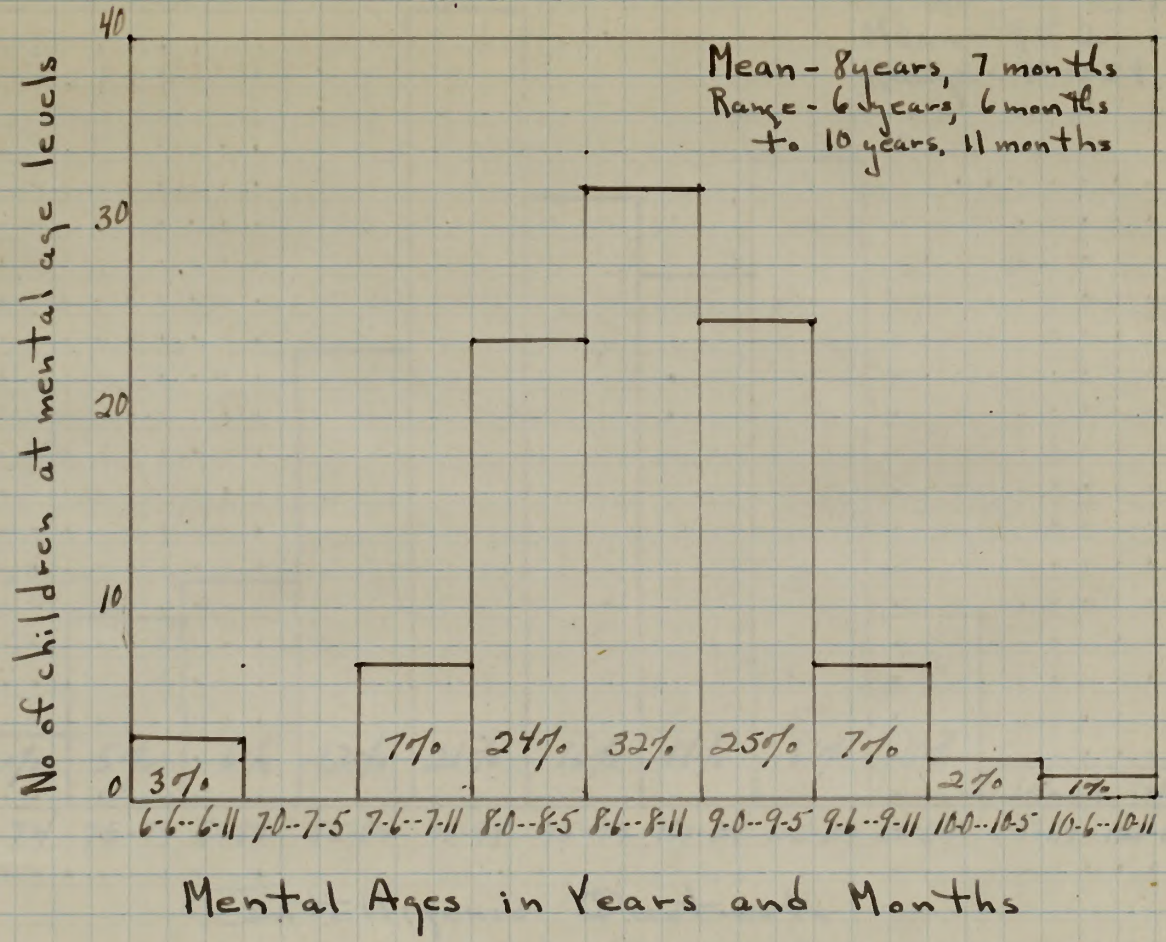
The distribution of intelligence quotients is shown in figure 8. The range is from 7- to 124 with a mean intelligence quotient of 95.2. The largest percent of the children 20.4% fall in the interval 90-94. 60% of the children are of below average intelligence as compared with 11% of the children in the second and third grade data.

Intelligence Quotient Distribution

I.Q.	Frequencies
70---74	2
75---79	4
80---84	5
85---89	11
90---94	19
95---99	15
100---104	13
105---109	16
110---114	5
115---119	1
120---124	1

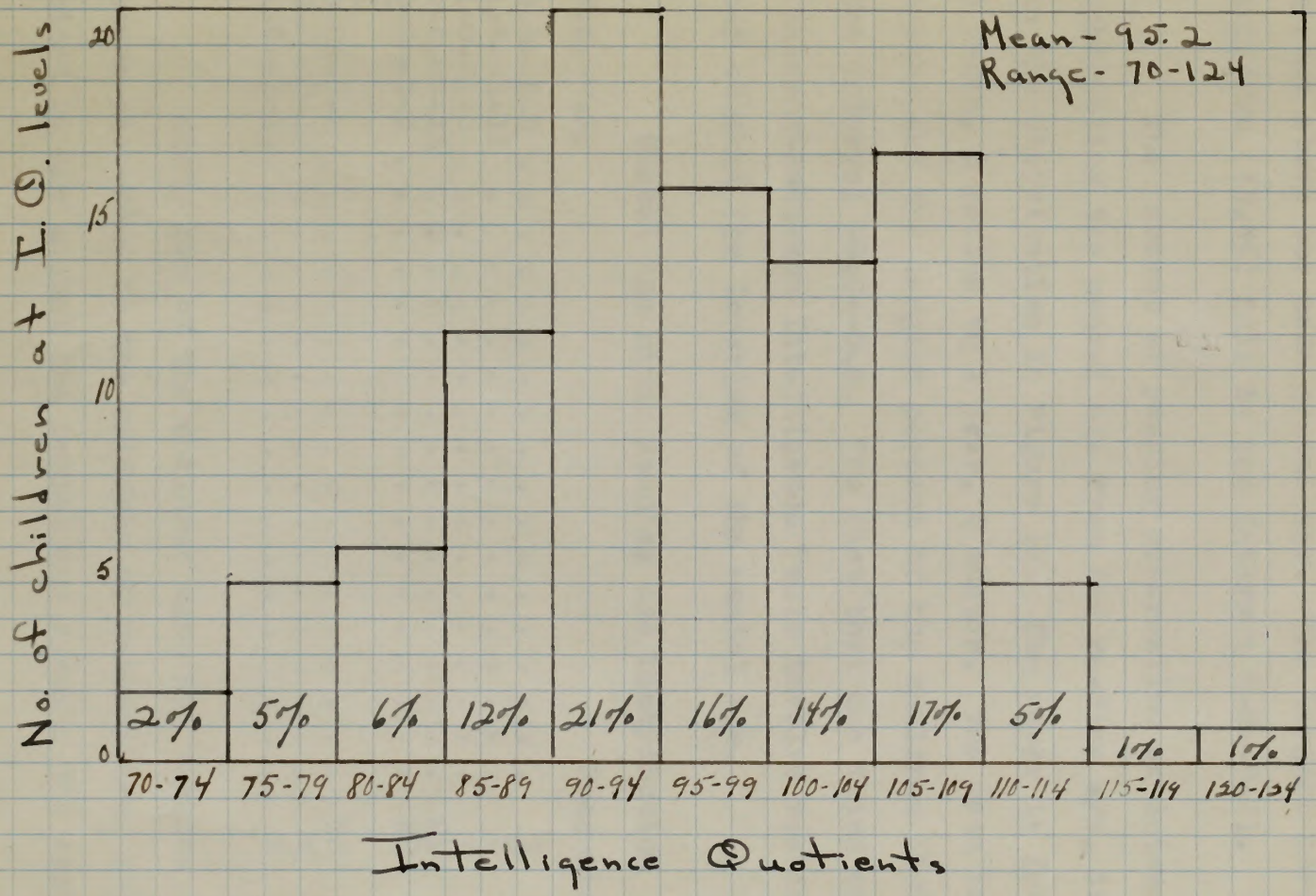
The reading ages taken from the initial reading test are distributed in Figure 9. These children at the end of the

Figure 7



DISTRIBUTION OF MENTAL AGES OF NINTY-THREE CHILDREN

Figure 8



DISTRIBUTION OF INTELLIGENCE QUOTIENTS OF NINTY-THREE CHILDREN

third grade ranged in reading ages from 8 years to 10 years, 3 months, with a mean reading age of 9 years, 2 months, 7 months above the mean mental age. The largest percent of the children (33.3%) fall in the interval 8-8--8-11.

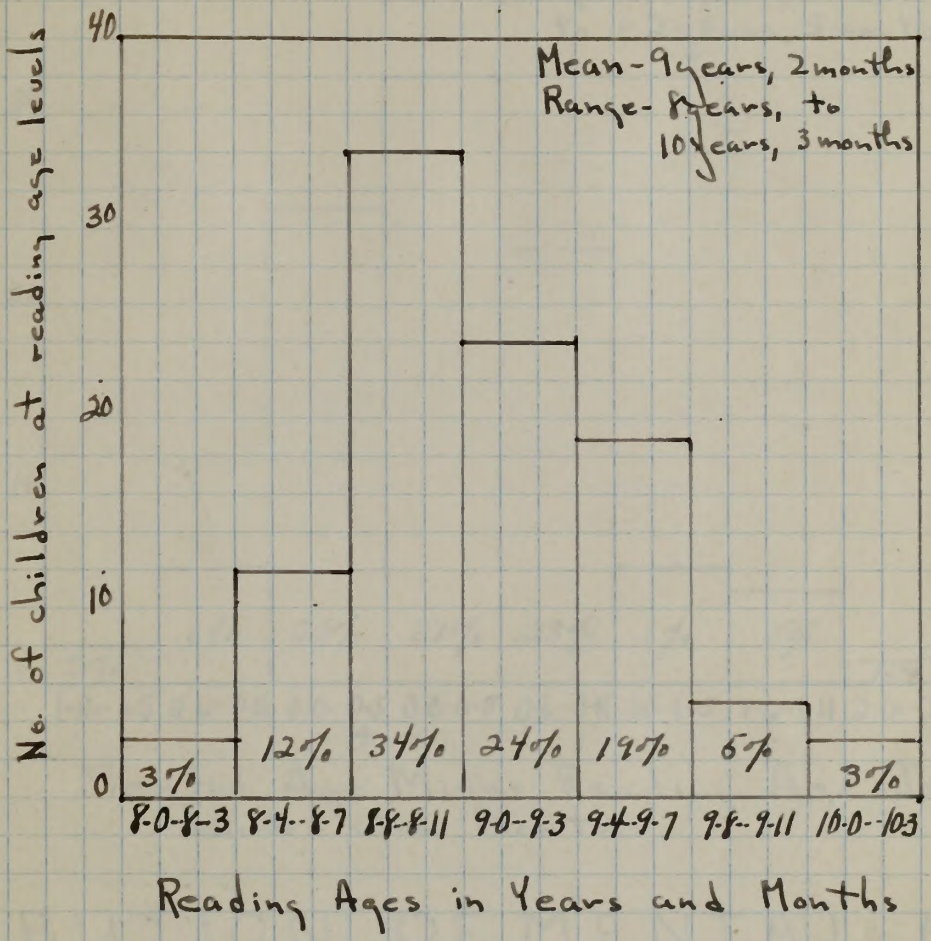
The amount of reading retardation as determined by subtracting the mental age from the reading age, is shown in the distribution in Figure 10. The range is from minus 2 years, 5 months to 1 year, 5 months. The mean is -6.1 months and the largest percent of the children (32%) fall in the interval -0.0--0.5. The fact that one third of the Kuhlmann-Anderson Intelligence Tests involve reading ability may account for lowering of the mental age.

Mental Age minus Reading Age Distribution

M.A.-R.A.	Frequencies
2-0--2-5	1
1-6--1-11	5
1-0--1-5	6
0-6--0-11	21
$\underline{0}$-0--0-5	29
+	
0-0--0-5	23
0-6--0-11	6
1-0--1-11	2

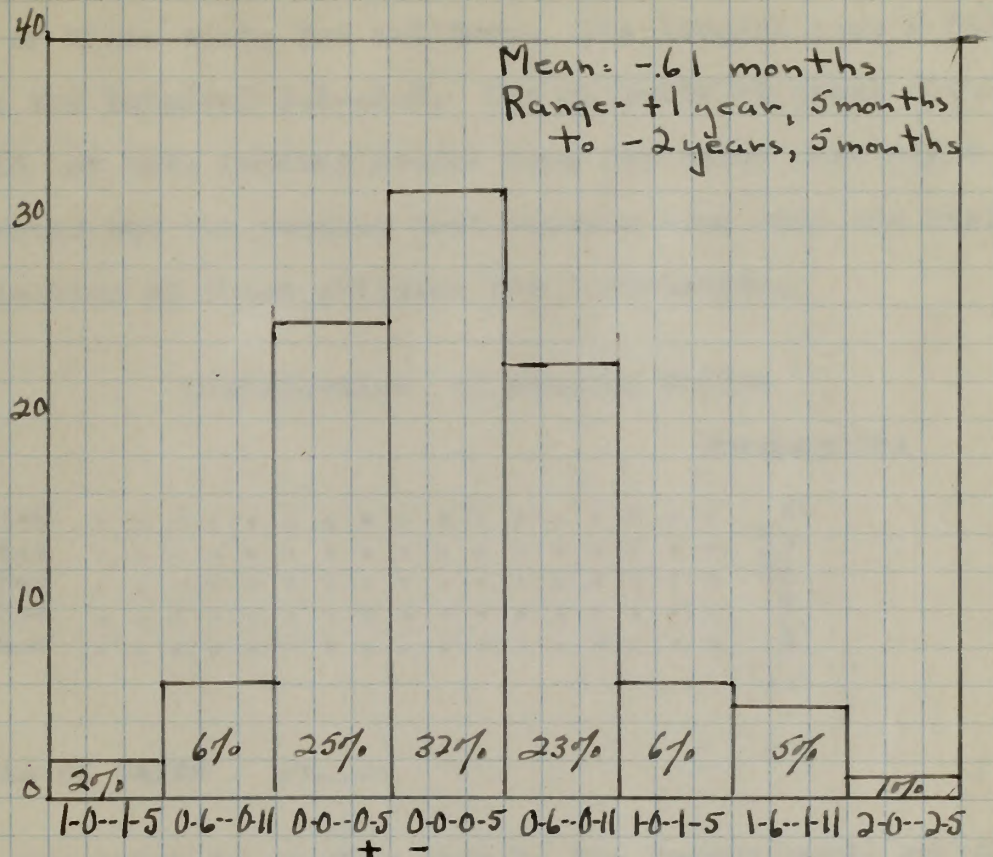
Sixty two of the children were not reading disability cases according to the criteria of retardation being determined by the amount the mental age exceeds the reading age.

Figure 9



DISTRIBUTION OF READING AGES OF NINTY-THREE CHILDREN

Figure 10



DISTRIBUTION OF MENTAL AGES MINUS READING AGES OF NINTY-THREE CHILDREN

The table below shows the distribution of reading grades of these sixty two children. The largest number (33) fall in the interval 3-5--3-9. The majority of these children did not have reading grades very far below what might be expected but the reading test results were only one basis for selection of these children for instruction.

Distribution of Reading Grades

R.G.	Frequencies
4-5---4-9	6
4-0---4-4	13
3-5---3-9	33
3-0---3-4	9
2-5---2-9	1
	62

Analysis of Gains 4th Grade

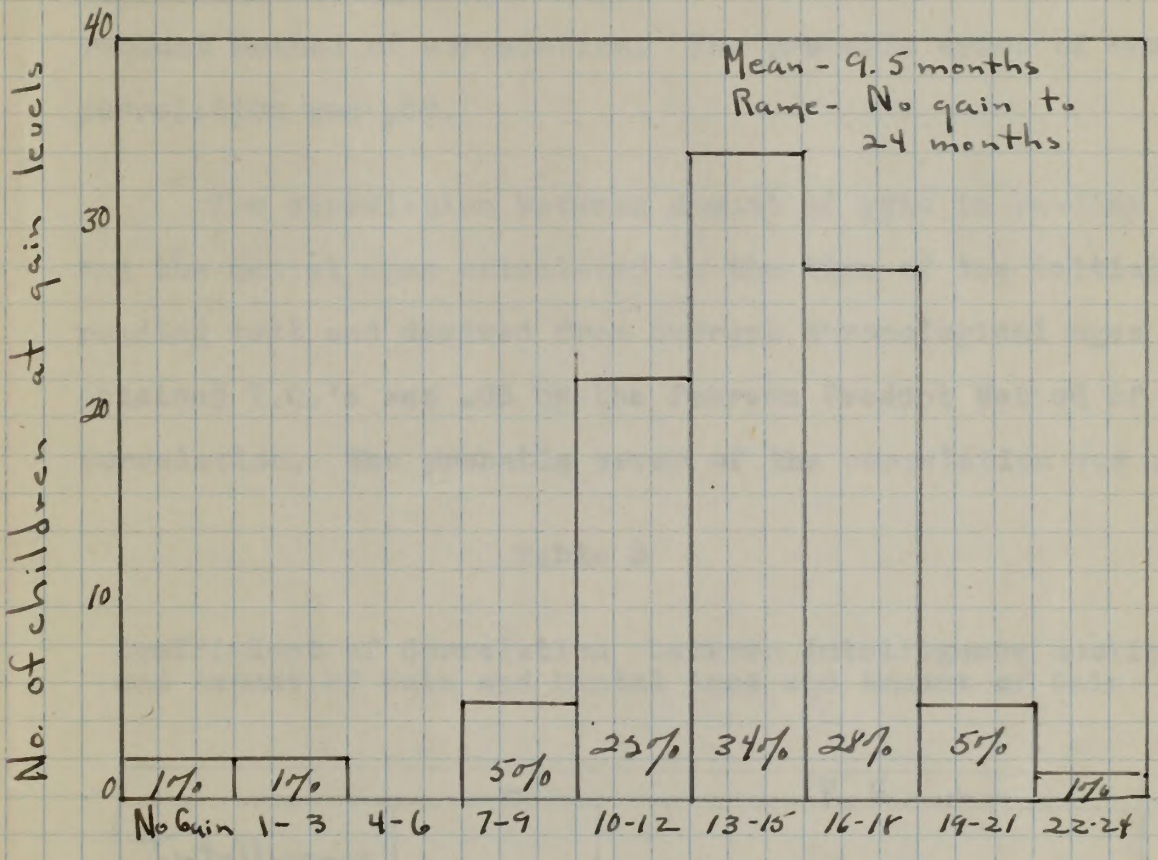
The gains in reading made by the fourth grade children have been analyzed in the same manner as the gains made by the second and third grade children.

The amount of gain made in reading was determined by subtracting the results of the initial reading test from the results of the final reading test. Figure 11 shows the distribution of the amount of gain made by the group. The range is from no gain to 2 years, 4 months gain, with a mean gain of 1.3. 92.4% made over one years gain, 6.4% made less than one years gain and 1.1% made no gain.

Amount of Gain Distribution

Gain in Tenths of year	Frequencies
No Gain	
1-3	1
4-6	1
7-9	0
10-12	20
13-15	33
16-18	26
19-21	5
22-24	2
	88

Figure 11



DISTRIBUTION OF AMOUNT OF GAIN IN READING OF NINTY-THREE CHILDREN

The correlation between the amount of gain in reading and the intelligence quotients derived from the Kuhlmann-Anderson Tests of Intelligence was .24 by the Pearson Product Method of correlation. The probable error of the correlation was .06.

The correlation between amount of gain in reading and the mental ages calculated to the time of the initial reading test and derived from current chronological ages and obtained I.Q.'s was .03 by the Pearson Product Method of correlation. The probable error of the correlation was .1[illegible].

Table 5

Coefficient of Correlation between Intelligence Quotients and Amount of Gain and Mental Ages and Amount of Gain

	r	P. E. of r.
Intelligence Quotients	.24	.06
Mental Ages	.03	.1

Table 7 compares initial reading ages and amount of gain. The gains are uniform with those children falling in the interval 8-8--8-11 having a gain of 1.5, those in the intervals 9-4--9-7, 9-8--9-11 with a gain of 1.4, and those in the intervals 8-4--8-7 and 9-0--9-3 with a gain of 1.3. The highest mean gain (1.8) was made by the three cases in the interval 8-0--8-3, and the lowest (.5) by the three cases in the interval 10-0--10-3.

Table 7

Initial Reading Age vs. Gain

Gain in Tenths of Year

R. A.	No Gain	1-3	4-6	7-9	10-12	13-16	16-18	19-21	22-24	No.	Mean
10-0--10-3	1			2						3	.5
9-8--9-11				1	2	2				5	1.5
9-4--9-7				1	5	5	7			18	1.4
9-0--9-3		1		1	7	6	6			21	1.3
8-8--8-11					5	15	10	21		33	1.5
8-4--8-7				1	4	2	3			10	1.3
8-0--8-3					1	1			1	3	1.8

Table 6 shows the amount of gain compared with chronological age. The same mean gain (1.4) was made by the children falling in the intervals 11-0--11-11, 9-0--9-11, and 8-0--8-11. The children in the interval 10-0--10-11, made one month less mean gain (1.3). The two cases in the interval 7-0--7-11 made the greatest mean gain (1.7). The relation between gain and chronological age with the range of this data is insignificant

Table 6

Chronological Age on Admission vs. Gain

C. A.	Gain in tenths of year										
	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	No.	Mean
11-0--11-11					5	1	2		1	9	1.4
10-0--10-11					5	6				12	1.3
9-0--9-11				4	8	15	14			43	1.4
8-0--8-11	1	1		1	2	11	10		1	30	1.4
7-0--7-11							2			2	1.7
6-0--6-11											

This data had the majority of children with reading ages in excess of their mental ages. In comparing the mental age minus reading age with the amount of gain made in reading Table 8, it may be seen that the children falling in the interval 0-0--0-11 made one month more mean gain than those falling in the interval -0-0--0-11. Those falling in the interval -1-0--1-11 made the smallest mean gain (1.1). Here mental age certainly has not set a limit on achievement under remedial reading instruction. It should be remembered, however, that the mental ages of these children were taken from the Kuhlmann-Anderson Tests of Intelligence and one third of these tests require reading ability. If these children had a genuine reading disability this might account for a lowering of the mental ages.

Table 8

Mental Age minus Reading Age. vs. Gain

	Gain in Tenths of Year										
MA-RA	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	No.	Mean
+ 0-0-11				1	6	11	10	2	1	31	1.5
- 0-0-11		1		1	9	19	17	3	1	56	1.4
1-0-1-11	1		1	2	5	3				12	1.1

Ninth Grade Study

Description of Data

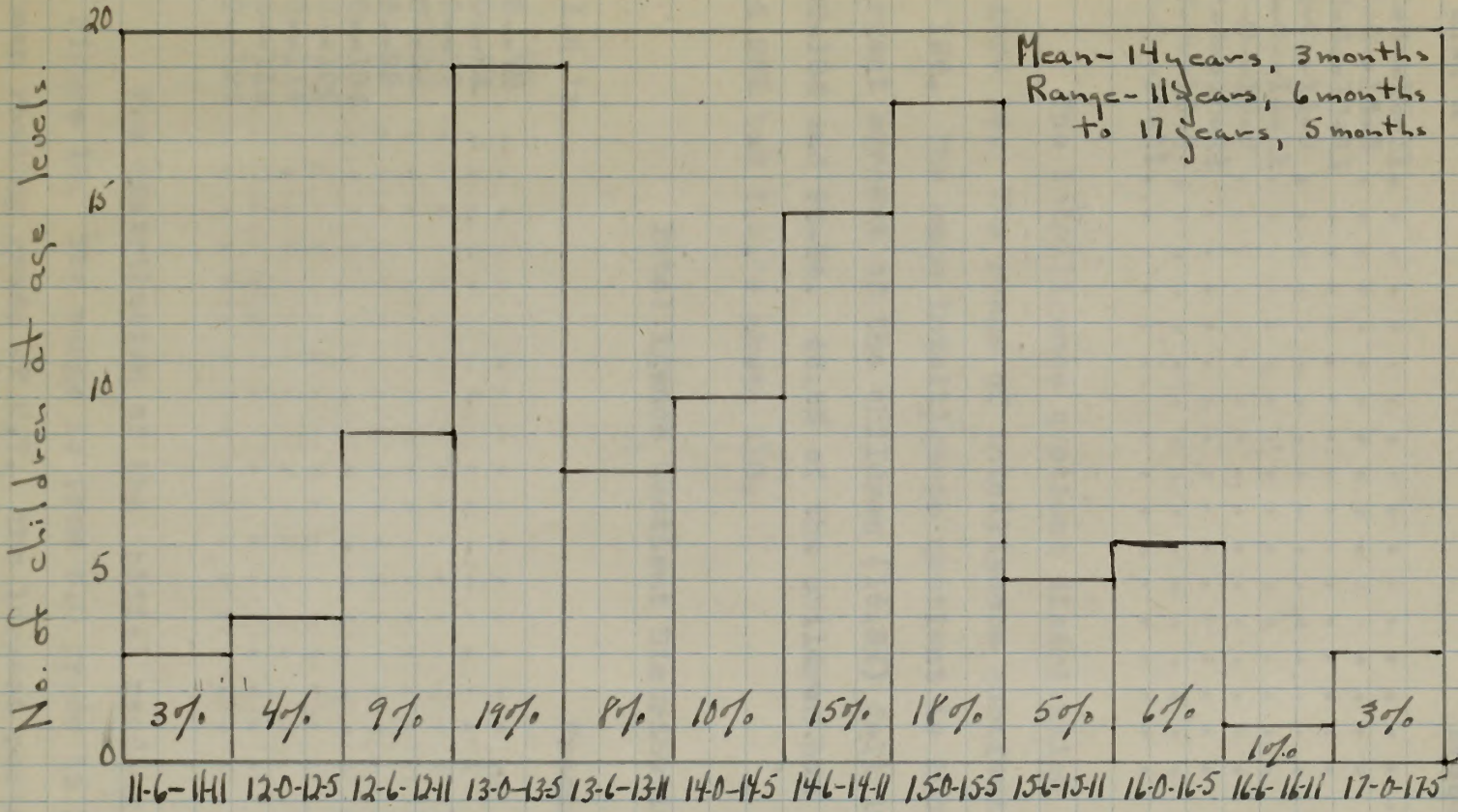
The chronological ages of one hundred and thirteen children in the ninth grade are distributed in Figure 12. The range of chronological ages is from 11 years, 6 months to 17 years, 5 months, with a mean age of 14 years, 3 months. The largest percent of the children (18.5%) fall in the interval 13-0--13-5.

Age Distribution

C.A.'s	Frequencies
11-6--11-11	3
12-0--12-5	5
12-6--12-11	10
13-0--13-5	21
13-6--13-11	9
14-0--14-5	11
14-6--14-11	17
15-0--15-11	20
15-6--15-11	6
16-0--16-11	7
16-6--16-11	1
17-0--17-11	3

Figure 13 shows the mental age distribution of the group. The range is from 12 years, 6 months to 16 years, 11 months. The mean mental age is 14 years, 6 months. The largest percent of the children (21.2%) fall in the interval 14-0--14-5.

Figure 12



DISTRIBUTION OF CHRONOLOGICAL AGES OF ONE HUNDRED THIRTEEN CHILDREN

Mental Age Distribution

M.A.'s	Frequencies
12-6--12-11	1
13-0--13-5	13
13-6--13-11	20
14-0--14-5	24
14-6--14-11	19
15-0--15-5	21
15-6--15-11	11
16-0--16-5	3
16-6--16-11	1

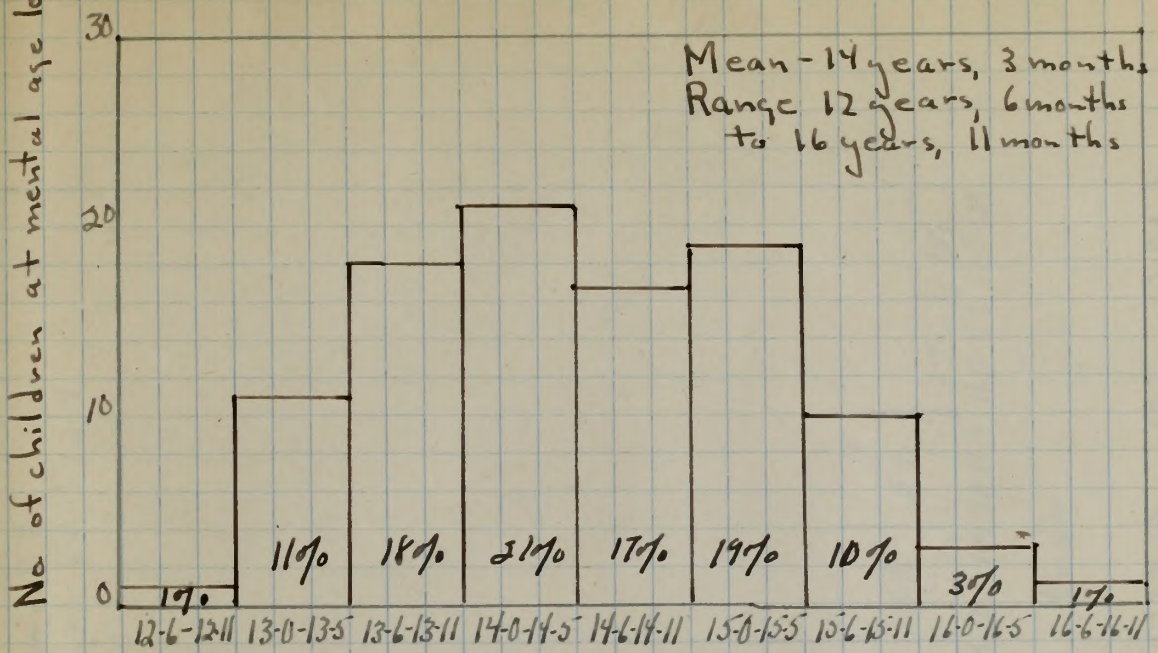
The intelligence quotient distribution is shown in Figure 14. The range of intelligence quotients is from 75 to 124. The mean intelligence quotient is 100.3, and the largest percent of the children (16.8%) fall in two intervals 100-104 and 90-94. 46.9% of the children had I.Q.'s below 90 and 23% had I.Q.'s above 110.

Intelligence Quotient Distribution

I.Q.'s	Frequencies
75--79	3
80--84	5
85--89	15
90--94	11
95--99	19
100--104	15
105--109	19
110--114	18
115--119	5
120--124	3

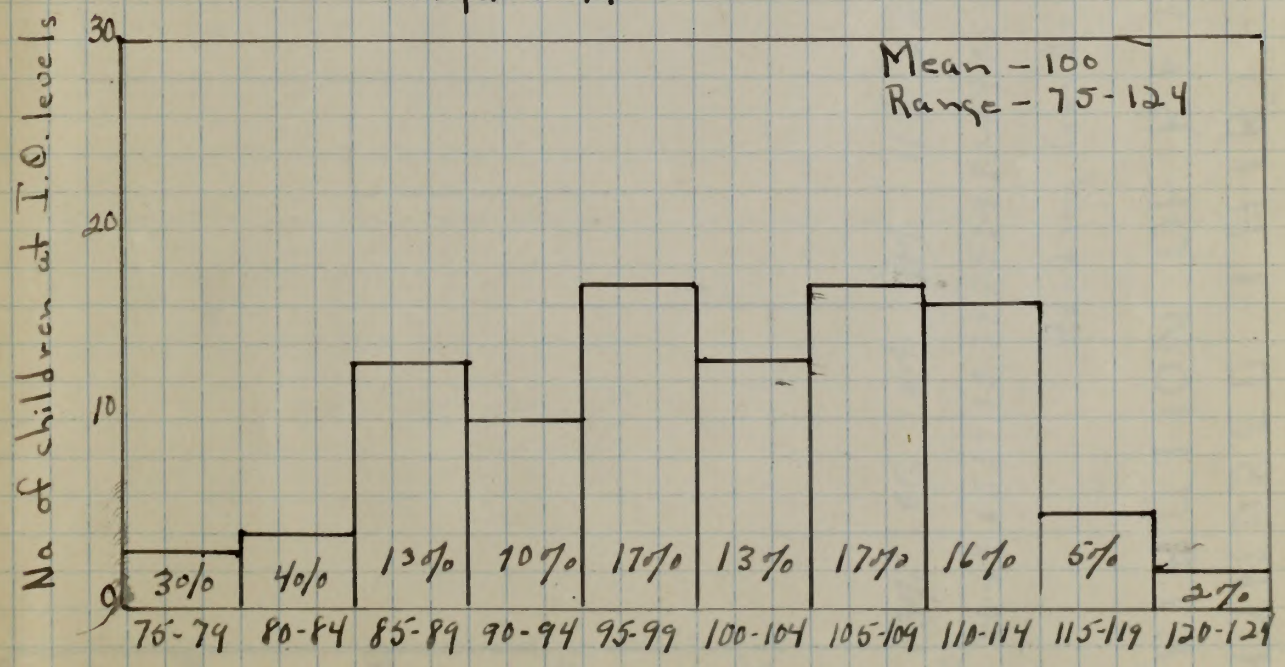
The distribution of the initial reading grades is shown in Figure 15. The range is from 6.0 grade to 12.4 grade with a mean reading grade of 8.7. The largest percent of the

Figure 13



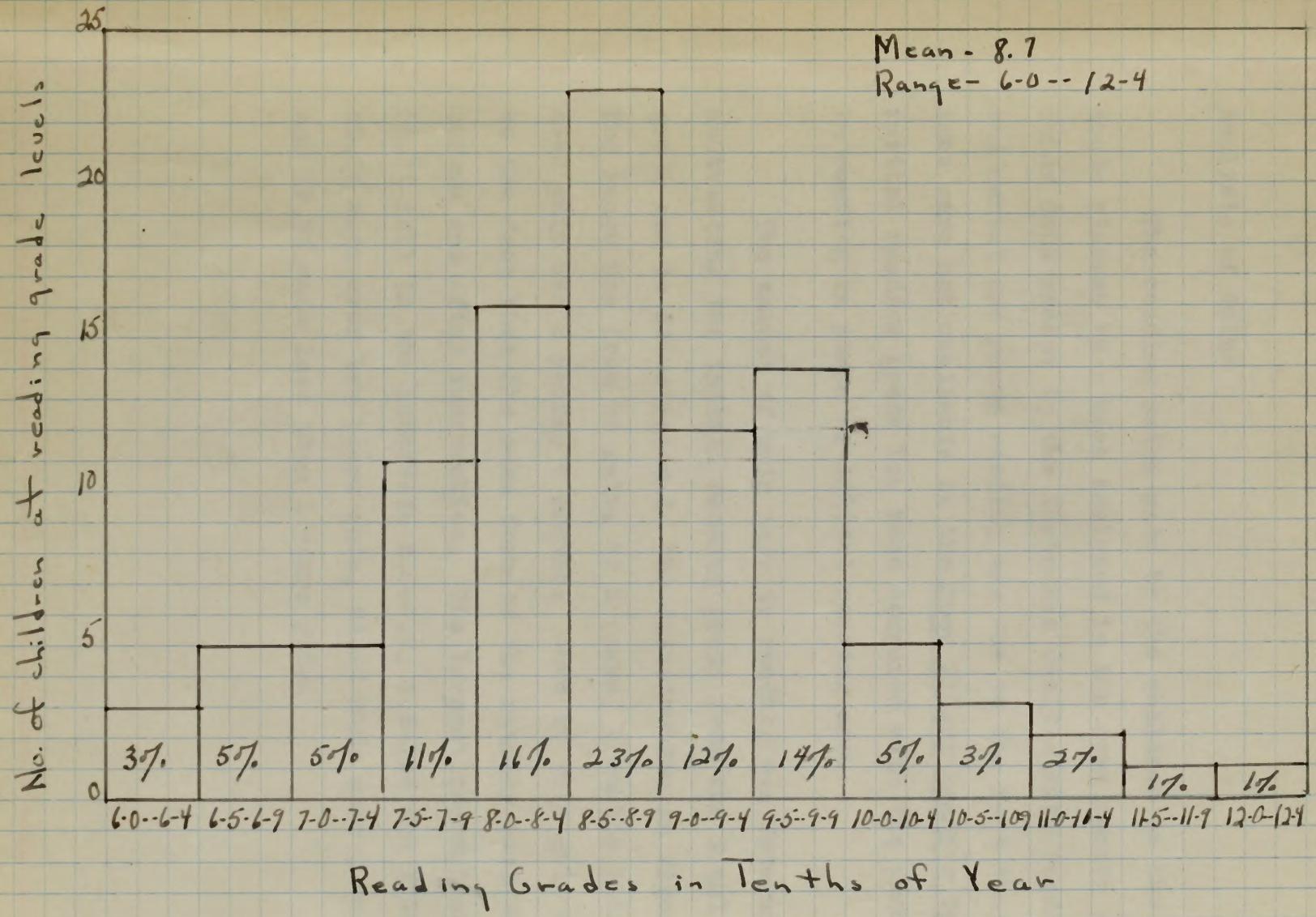
DISTRIBUTION OF MENTAL AGES OF ONE HUNDRED THIRTEEN CHILDREN

Figure 14



DISTRIBUTION OF INTELLIGENCE QUOTIENTS OF ONE HUNDRED THIRTEEN CHILDREN

Figure 15



DISTRIBUTION OF READING GRADES OF ONE HUNDRED THIRTEEN CHILDREN

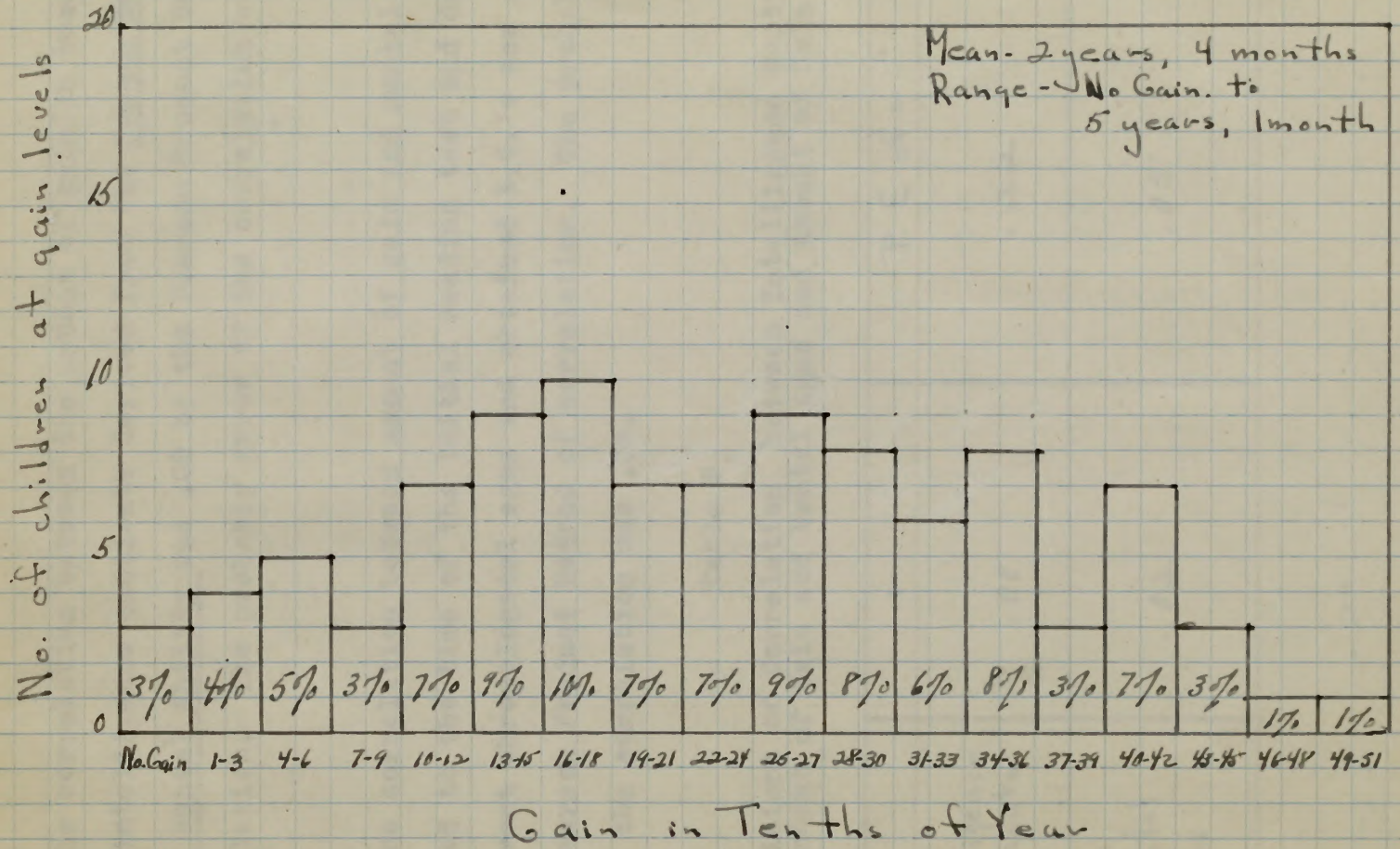
children (23%) fall in the interval 8.5--8.9.

Analysis of Gains

The reading gains made by the children in the ninth grade classes have been analyzed in the same manner as the other data except in the instances dealing with reading age and mental age minus reading age due to the fact that reading ages were not available on the Iowa Silent Reading Test. The initial reading grade has been compared with the amount of gain in reading in place of initial reading age.

The amount of gain made in reading was determined by subtracting the initial reading grade from the final reading grade and is illustrated in the distribution in Figure 16. The range was from no gain, to 5 years, 1 months gain. The mean gain was 2 years, 4 months. Some of this gain may be due to the fact that the same form of the reading test was used before and after instruction. The largest percent of children (9.7) fall in the intervals 4.0-4.2, 1.6-1.8 and 1.3-1.5. 55.6% made over two years gain, 81.2% made over 1 years gain and 15.9% made less than 1 years gain.

Figure 16



DISTRIBUTION OF AMOUNT OF GAIN IN READING OF NINTY-THREE CHILDREN

The correlation between the amount of gain in reading and the intelligence quotients derived from the Henmon Nelson Tests of Mental Ability was .08 by the Pearson Product Method of correlation. The probably error of the correlation was .22.

The correlation between amount of gain and mental ages calculated to the time of the initial reading test and derived from current chronologocal ages and obtained I.Q.'s was .02 by the Pearson Product Method of correlation. The probable error of the correlation was .05.

Table 9

Coefficient of Correlation between Intelligence Quotients and Amount of Gain and Mental Ages and Amount of Gain

	r	P. E of r
Intelligence Quotients	.08	.22
Mental Ages	.02	.05

Table 10 shows the amount of gain compared with the chronological ages. The highest mean gain (2.4) was made by those children falling in the interval 14-0--14-11, the next highest mean gain (2.3) was made by those in the interval 13-0--13-11 and the smallest mean gain (2.1) was made by those falling in the interval 15-0--15-11, and 16-0--16-11. The interval 12-6--12-11 had one case in it which made a gain of between .1-.3.

Chronological Age vs. Gain

Gain in tenths of year

C.A.	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36	37-39	40-42	43-45	46-48	49-51	No	Mean
16-0--16-11	1		1						1				1						4	2.1
15-0--15-11		3	2	2	1	2	3	4	2	2	3	2	1	1	3	1			32	2.1
14-0--14-11	1	2	2	2	2	1	6	3	1	3	8	2	3	2	4			1	43	2.4
13-0--13-11		1	1	1	5	4	3	1	2	2	4	2	2	1	2			1	33	2.3
12-0--12-11			1																1	.2

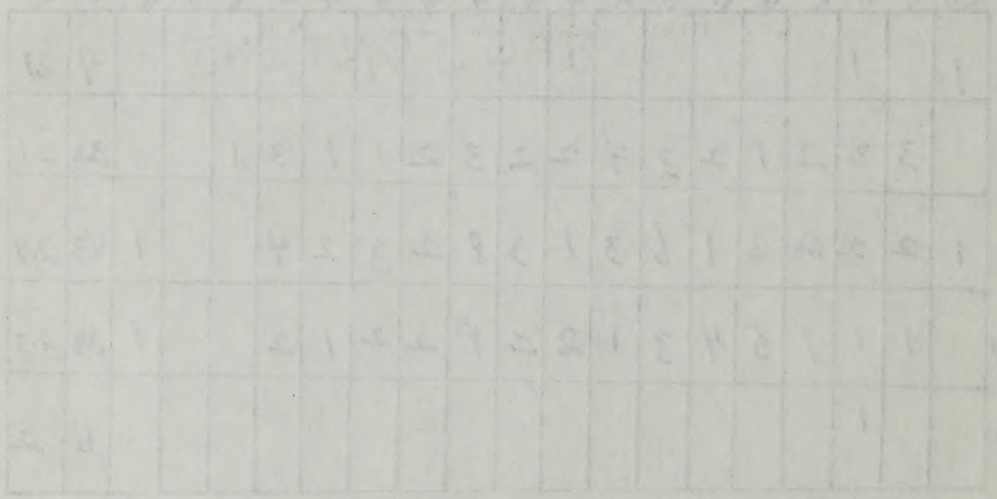
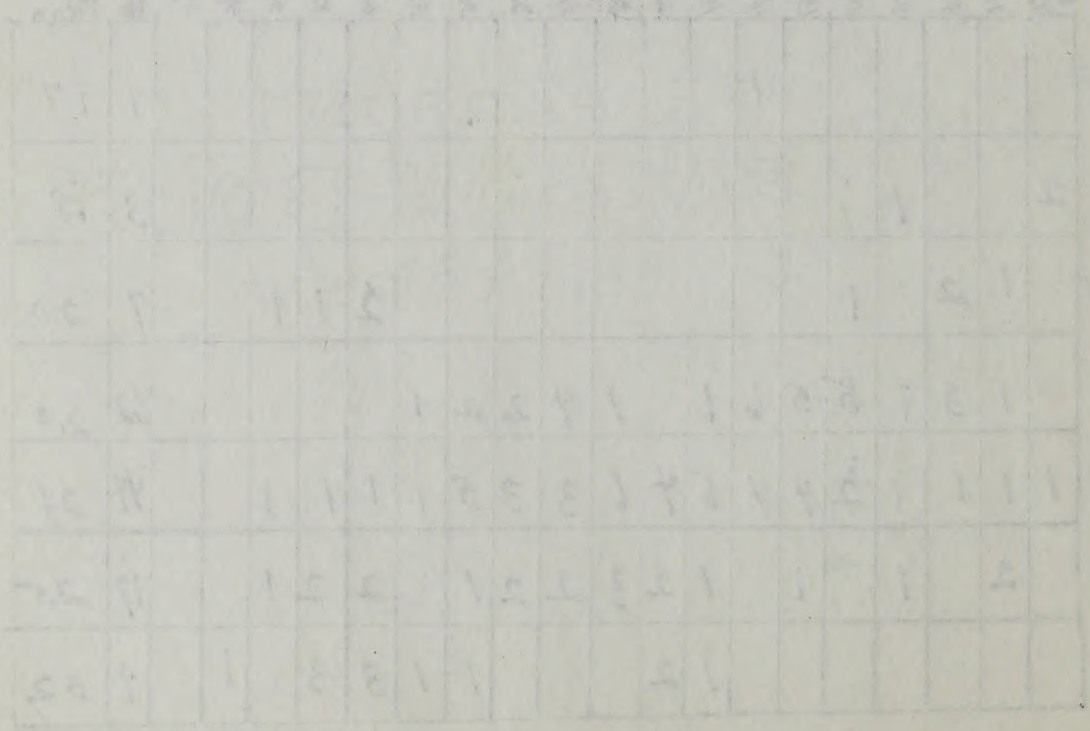


Table 11 compares the initial reading grade with the amount of gain. The highest mean gain (3.2) was made by those in the interval 6-0--6-11 but there were only 10 cases in this interval and 7 of these cases fell in the greater gain intervals which raised the mean gain. The children in the interval 7-0--7-11 made the next highest mean gain (2.5). Those in the intervals 8-0--8-11, 9-0--9-11, 10-0--10-11 made similar gains (2.1, 2.0, 2.0). The interval 12-0--12-11 had one case which made a gain between 1.6-1.8, and the interval 11-0--11-11 had one case which made a gain between .7 and .9. and two cases which made no gain.

Initial Reading Gr vs. Gain

Gain in tenths of year

R.G.	No Gain	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	No	Mean
12-0--12-11							1													1	1.7
11-0-11-11	2			1																3	.8
10-0-10-11		1	2		1										2	1	1			7	2.0
9-0--9-11		1	3	1	5	5	6	1		1	4	2	2	1						32	2.0
8-0--8-11	1	1	1	1	5	4	4	5	4	6	3	3	5	1	1	1	1			44	2.1
7-0--7-11		2		1		1		1	2	3	2	2	1		2	2	1			17	2.5
6-0--6-11								1	2				1	1	3	3		1		9	3.2



Chapter IV

CONCLUSIONS

Conclusions

The primary purpose of this study was to discover the relationship of amount of gain in reading to intelligence, to determine the advisability of admitting children with low intelligence to remedial instruction. The data in the study has been analyzed for this purpose. It has been also analyzed to determine the relationship between amount of gain to chronological age, initial reading age, and mental age minus reading age.

Three separate studies have been made and all three studies are characterized by the findings which are below, with exceptions which have been noted.

1. There was no relationship between intelligence quotients and amount of gain in reading.

2. There was no relationship between mental ages and amount of gain in reading.

3. There was no relationship between chronological ages and amount of gain in reading.

4. There was no relationship between initial reading age and amount of gain in reading within the limits of the second and third grade data and fourth grade data.

5. There was no relationship between intial reading grade and amount of gain in reading within the limits of the ninth grade data.

6. The amount of retardation did not determine the amount of gain made in reading within the limits of the second and third grade data and fourth grade data.

7. Mental age did not limit the amount of gain made in reading within the limits of the second and third grade and fourth grade data.

Educational Implications

The implications for education in the conclusions reached as a result of the analysis of the three sets of data are as follows:

1. It is not advisable to exclude children of low intelligence from remedial reading instruction on the basis that low intelligence limits the improvability of students under remedial reading instruction.

2. Mental age does not necessarily set a limit on the amount of gain that may be made under remedial instruction in reading. Some children may be expected to read beyond their mental age.

3. The criteria of mental age minus reading age determining whether a child is a reading disability case is questionable from the standpoint that children with reading ages in excess of mental ages and not reading up to grade can make gains under remedial reading instruction.

Limitations of the Data

The limitations of the data used in this study are as follows:

1. An increase in the number of cases in each set of data would make the generalizations regarding the data more accurate.

2. The study is limited to second and third, fourth and ninth grades.

3. The mental ages and intelligence quotients of the fourth and ninth grade data were taken from group tests of intelligence which involved a relatively large amount of reading ability.

4. Each set of data had different remedial reading set-ups. It is possible that varying factors that affected one set of data, influencing the results, did not affect the other data.

5. The children in the ninth grade data were administered the same reading tests before and after instruction, a factor which may account for some of the gains made by these children.

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